The Greek Debt Crisis: Likely Causes, Mechanics and Outcomes

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Abstract

We use insights from the literature on currency crises to offer an analytical treatment of the crisis in the market for Greek government bonds. We argue that the crisis itself and its escalating nature are very likely to be the result of: (a) steady deterioration of Greek macroeconomic fundamentals over 2001-2009 to levels inconsistent with long-term EMU participation; and (b) a double shift in markets' expectations, from a regime of credible commitment to future EMU participation under an implicit EMU/German guarantee of Greek fiscal liabilities, to a regime of non-credible EMU commitment without fiscal guarantees, respectively occurring in November 2009 and February/March 2010. We argue that the risk of contagion to other periphery EMU countries is significant; and that without extensive structural reforms the sustainability of the EMU is in question.

JEL-Code: F31, F33, F34, F41, F42, F50.

Keywords: currency crises, bonds market, expectations, fiscal guarantees, contagion.

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1. Introduction

The ongoing crisis in the market for Greek government bonds is the first major test of the Eurozone area. As such, it is certain to attract, in due course, considerable academic attention shedding light to its origins, mechanics and lessons. But with events still unfolding, time is of essence: Any insights to the crisis' likely causes, mechanics and outcomes, however imperfect, are bound to be useful.

When in unchartered territory academics' typical initial response is a first-pass assessment using tools available at hand. This article provides such an attempt. More specifically, we offer an initial exploration of the Greek crisis up to the date of writing (April 2010) using insights drawn from the literature on currency crises. We argue that insights from this literature explains surprisingly well the recent turmoil in the behaviour of prices and yields for Greek debt and can provide valuable lessons for EU policy makers. In particular, the steep ascending path of yields on Greek government bonds in the last months and the ensuing loss of confidence in the country's ability to service its debt can be explained by a simple model using ingredients from Obstfeld's (1996) framework of self fulfilling currency crisis and Krugman's (1998) treatment of the 1998 Asian crisis.

In a nutshell the simple model we propose in this paper combines three factors. *First*, deteriorating macroeconomic fundamentals over the period 2001-2009, mirrored in an external competitiveness deficit coupled with an unsustainable path for fiscal finances. *Second*, a shift in market expectations pricing a possible exit of Greece from the EMU, mainly due to the lack of commitment of Greek authorities to undertake unpopular structural reforms. *Third*, the pricing by markets of a (previously non-existent) default risk that follows the withdrawal of an implicit guarantee on Greek debt by other EMU countries (mainly Germany). Interestingly, our account of the factors sparking and escalating the crisis also

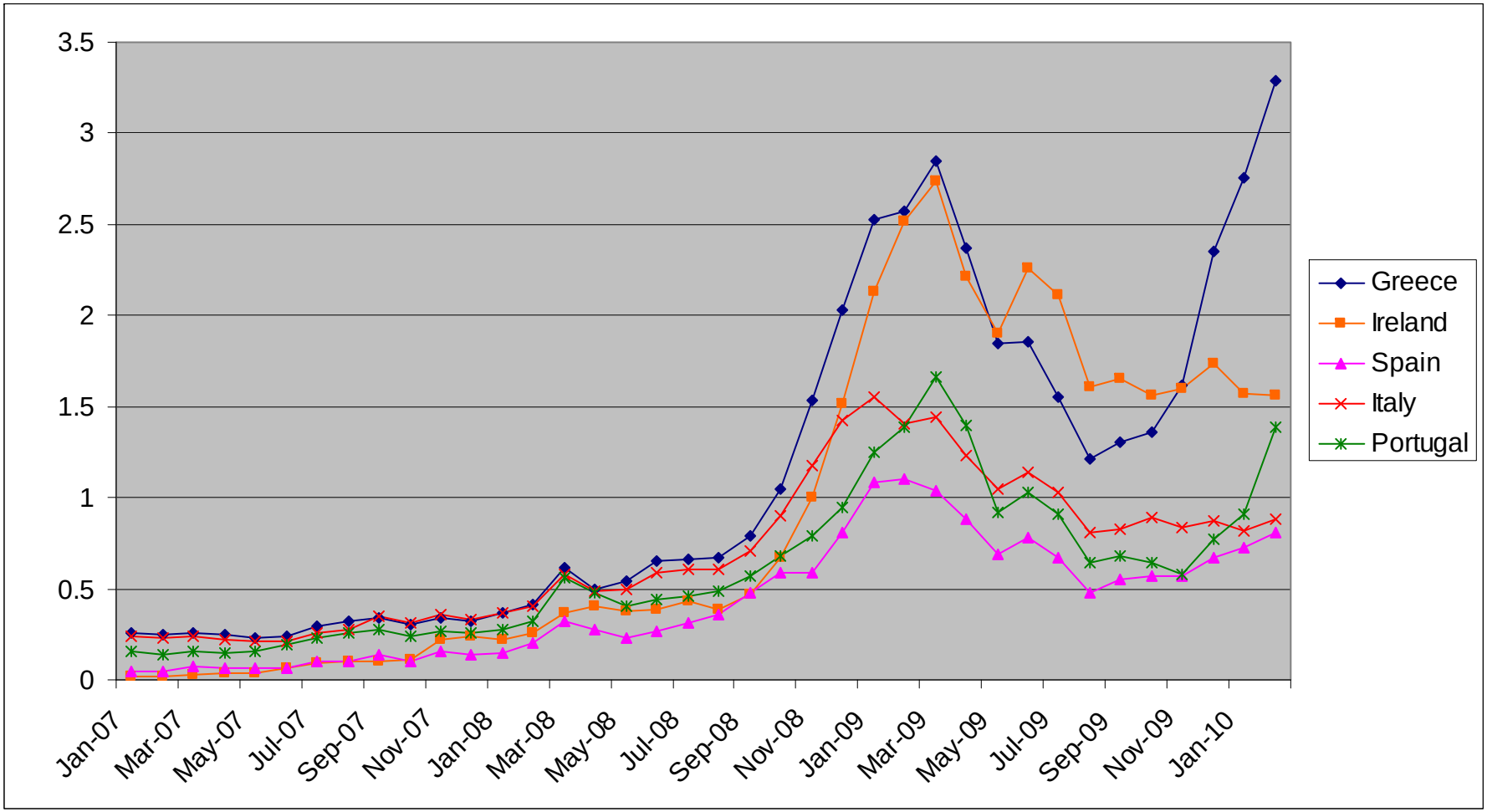
helps explain why prices on Greek government bonds have not recovered but continued to plummet following the announcement of the EU/IMF rescue plan. Our analysis suggests the involvement of an external institution like the IMF in EU affairs will in all likelihood widen market uncertainty over possible co-ordination failures between the EU and IMF policy makers and fail to stabilize market expectations on a credible resolution of the Greek crisis.

The rest of the paper is structured as follows. Section 2 provides a brief description of events surrounding the crisis. Section 3 brings together elements from the currency crisis literature to explain the onset and intensification of the Greek crisis. Section 4 presents a simple model. Section 5 discusses future outcomes and section 6 concludes.

2. The facts

We provide a description of the events which a theory of the Greek debt crisis should be able to explain. Up to the point of writing (end April 2010) the crisis has evolved in five distinct stages. Its starting point can be traced at the onset of the USA sub-prime crisis in the summer of 2007 (see Figure 1). Starting from a value of 25 basis points (b.p.), the spread of the 10-year Greek government bond yield against the German bund entered a moderately ascending path reaching 65 b.p. in August 2008. A second, much more intense, phase followed between September 2008 and March 2009. This marked the peak of the global credit crunch crisis, by the end of which the Greek spread had reached 285 b.p. Similar developments were observed in the rest of the EMU periphery countries; it was clear, however, that markets were distinguishing against Greek and Irish bonds. A brief period of de-escalation, between April and August 2009, coinciding with the partial easing of the global crisis, followed. Nevertheless, although in August 2009 the Greek spread declined to 121 b.p., it was clear that, relative to other periphery EMU countries, markets continued to have Greek and Irish bonds on their bad books.

Figure 1: Spread of ten-year government bond yields against Germany (monthly average)*



Source: Eurostat. Values reported for April 2010 are those recorded on the 22 April 2010, the eve of the Greek request for the activation of the IMF/EMU support mechanism

The fourth stage of the crisis covers the period between September 2009 and mid-November 2010. During this period the Greek spread increased only marginally, remaining in the range of 120-130 b.p. However, we classify this as a separate period because it includes three key events. First the run-up to a snap election called for 4 October 2009. This produced a land-slide government change. Second, the new government's announcement in mid-October 2009 of a substantial overshooting in the previous government's projection for the value of Greece's 2009 budget deficit, from 6% to 12.7% of GDP. Third, the submission by the new government to the European Commission, in mid-November 2010, of Greece's proposed public budget for 2010. This event defines the beginning of the fifth and most intense phase, with spreads increasing from 135 b.p. in mid-November 2009, a rapid acceleration after February 2010, to 586 b.p. on 22 April 2010. Similar trends were observed in Portugal, and to a lesser extend Spain, involving however, significantly lower spread levels.

Negotiations among EMU member-states in the first quarter of 2010 regarding actions to contain the crisis revealed a clear split. A number of countries, most prominently Germany, opposed a Greek bail-out while others, including France, appeared more favourable. Eventually, on 25 March 2010, EU leaders agreed on a compromise, involving a mechanism of bilateral loans to Greece from other EU members, as well as IMF loans at rates lower than the market rate. The announced plan involved a total sum of approximately 45 billion euros, with two thirds coming from bilateral EU loans and one third from the IMF. The plan's announcement failed to calm markets, which put Greek bonds under further intense pressure. Finally, and following another upward revision of the 2009 Greek budget deficit to 13.6% of GDP, on 23 April 2010 Greek authorities formally requested the activation of the EU/IMF rescue mechanism.

3. Likely causes and mechanics

The background: deteriorating Greek fundamentals

So how can the literature on currency crisis help us explain the Greek debt crisis and what does it predict, if anything, regarding its eventual outcome? In the first-generation crisis model proposed by Krugman (1979) the speculative attack against a currency peg is the deterministic outcome of an unsustainable fiscal expansion pursued by a myopic government and financed by excessive money creation depleting foreign currency reserves. When reserves fall below a critical threshold, rational agents, in anticipation of the peg's future collapse, buy the government's remaining reserves forcing an immediate devaluation. This restores the exchange rate to a value consistent with Purchasing Power Parity (PPP).

This story's basic premise, i.e. unsustainable fiscal policy, is clearly present in the case of Greece. Also, since EMU accession in 2001 the country has experienced consistently higher inflation than the EMU average, resulting in substantial deviation from PPP, pronounced competitiveness losses and record current account deficits (see Arghyrou and Chortareas, 2008). Overall, there is little doubt that Greek fundamentals have deteriorated enough to justify a first-generation attack had Greece run a currency of its own.

But can the model explain the escalating nature of the crisis? It is rather difficult to suggest so. In Krugman's model the speculative attack is caused by the full predictability of the peg's ultimate collapse, prompting agents to buy all remaining reserves to avoid the capital losses associated with holding the domestic currency after its certain forthcoming devaluation. For this argument to apply in the bonds market we have to assume a fully predictable, or at least a highly likely, default on

public debt. That is an assumption too heroic to accept for Greece at the beginning of the crisis. When compared to the collapse of a conventional peg, debt default is a much rarer and therefore much less likely event, particularly for a Eurozone member with additional access to IMF emergency cash. So, although the deterioration of Greek fundamentals plays a key role in current events, the crisis' escalation in November 2009 is unlikely to have been caused by market fears of an imminent Greek debt default.

Shift in market expectations about Greek EMU membership

The second-generation currency crisis model by Obstfeld (1996) offers some further insights. In this model honouring or abandoning an exchange-rate peg commitment is the outcome of a loss minimisation problem solved by a fully rational government. To decide its optimal course of action the government balances the credibility cost incurring by defaulting on the peg against the macroeconomic cost arising from deviating from the equilibrium (PPP-consistent) exchange rate implied by the peg's maintenance. The cost of honouring the peg is a positive, quadratic function of the size of the peg's misalignment relative to PPP. In case of an overvaluation, this may take the form of negative output gap/increasing unemployment and/or higher interest on public debt. Below a critical overvaluation threshold, abandoning the peg is costlier than maintaining it, so the government finds it optimal to honour it; above this critical threshold, the opposite holds. Therefore, as in the first-generation model, excessive deterioration in fundamentals will result in the peg's unambiguous collapse.

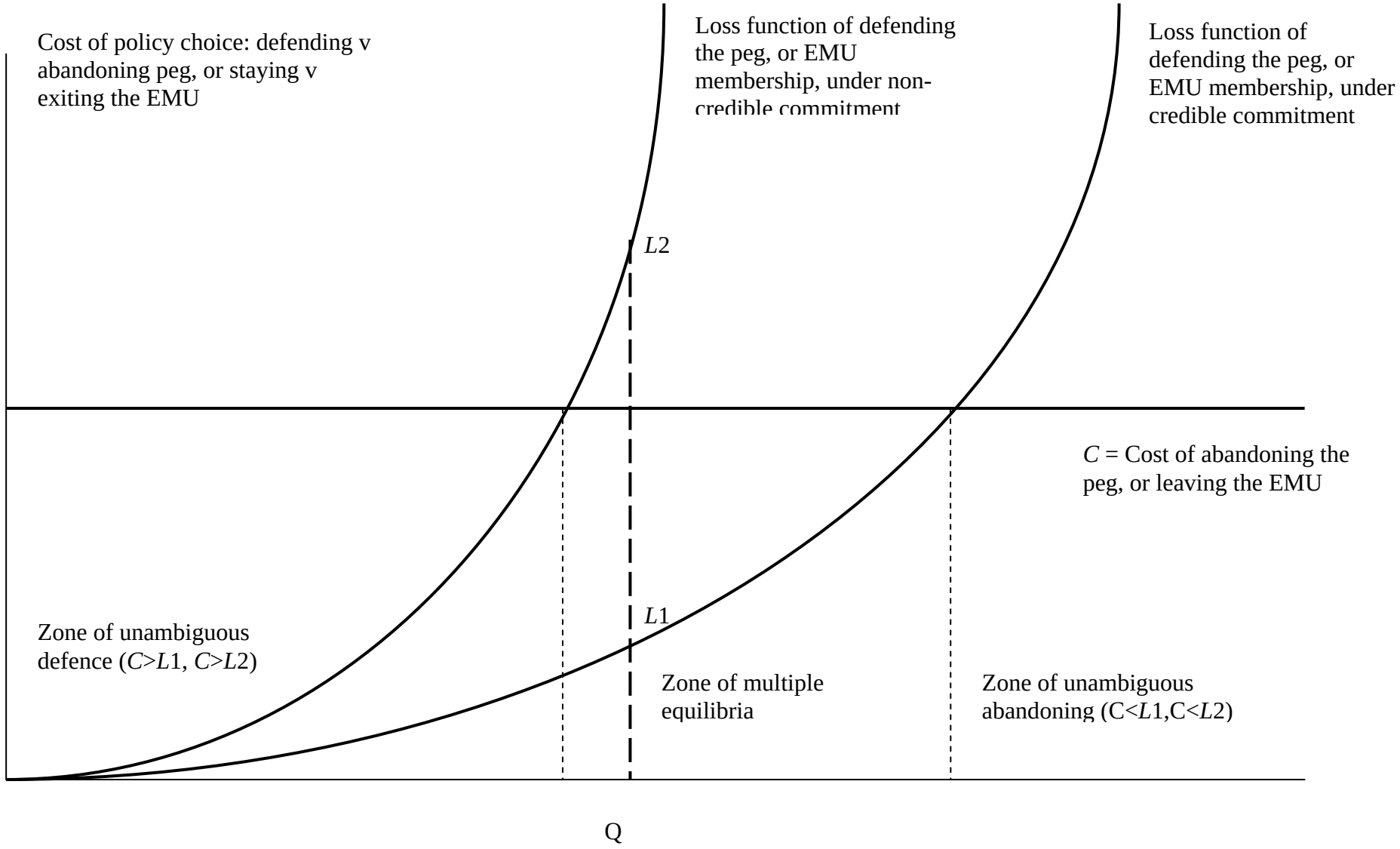
Crucially, however, in the second-generation model the peg's cost is endogenous to the private sector's expectations. For every level of overvaluation,

defending the peg is less costly under credible commitment.[1] This gives rise to two rather than one government loss functions: A relatively flat one, applying under credible peg commitment and a relatively steep one, applying under non-credible peg commitment (see Figure 2). This feature gives rise to two key characteristics: *First*, assuming for simplicity a constant cost of abandoning the peg equal to *C*, a zone of multiple equilibria: The same level of overvaluation (*Q*) corresponds to two rather than one potential exchange rate outcomes: maintaining the peg under credible commitment (*L*1 on the flat loss function); and abandoning it under non-credible commitment (*L*2 on the steep loss function). *Second*, self-fulfilling crises: within the multiple-equilibria zone, a shift in expectations from credible to non-credible commitment tilts the government's optimal response from maintaining to abandoning the peg. In that case, it collapses simply because the markets expect it to.

We now interpret commitment to an exchange rate peg as commitment to future EMU participation, indeed the ultimate form of a fixed exchange rate regime. A possible interpretation of events surrounding the Greek crisis is then as follows: In the wake of the global credit crunch in late 2008/early 2009 Greek fundamental were correctly judged by markets to have deteriorated enough to be inconsistent with long-run euro-participation. To convey this message to Greek authorities, markets sold a substantial, yet still not critical, volume of Greek bonds, prompting government to take corrective action. At that stage, Greek commitment to the EMU was not questioned and the authorities operated under the flat loss function (i.e. *L*1). The Greek government however, perhaps with an eye to the forthcoming election, failed to recognise the message and no corrective action was taken. The subsequent easing of the global credit crunch took some pressure off Greek bonds. Greece, however, along

[1] In this case, from UIP static exchange rate expectations imply a lower interest rate on government bonds.

Figure 2: The second generation crisis model



with Ireland remained under market scrutiny, as their spreads remained at levels considerably higher those of Italy, Portugal and Spain.

Following the election of October 2009, the markets gave the new government a window of opportunity to signal its policy intentions. But like its predecessor, the new government did not interpret correctly the markets' signals. During a few crucial initial weeks in office it appeared divided over its priorities and send mixed signals regarding its policy intensions by charging (wrongly) the markets with putting Greek bonds under unjustified speculative pressure. This lack of urgency/direction was confirmed by the exceedingly cautious, under the circumstances, proposed 2010 budget submitted to the European Commission in mid-November 2010. This proved to be a pivotal point, as markets interpreted the revealed unwillingness, or inability, of two successive Greek governments from both sides of the political spectrum to address unsustainable fundamentals as new information regarding the arithmetic of Greece's loss function. In response, for the first time in the crisis they started questioning Greece's commitment to the euro.

Therefore, the proposed budget submitted to the EU in mid-November 2010 was a game changer, it shifted the balance of expectations from credible to non-credible commitment, putting Greece from the flat to the steep loss function (*L2*). This explains the steep increase in Greek bond spreads observed in mid-November/December 2009 in the absence of further negative news on fundamentals. Events gathered momentum in the first quarter of 2010, with the release of data suggesting a deepening economic recession and increasing unemployment. In the markets' eyes, this restricts the already questionable government's ability to pursue reforms and reinforces the perceived temptation for Greece to leave the euro. This causes further negative shifts in expectations, further widening of spreads and an increasing cost of public debt which, in a circular process, causes further deterioration in expectations.

If the analysis above is correct, what we have observed in November 2009 was the mutation of a challenging crisis of deteriorating fundamentals into a full blown crisis of confidence in the Greek monetary regime. This explains the failure of the announced EU/IMF rescue plan to relieve the pressure on Greek spreads. It failed to do so because the Greek spread was not only driven by an increasing risk of default (to be fully explained below) but also increasingly strong expectations that Greece cannot bear, or is not willing to bear, the cost of reforms necessary to stay in the euro. In other words, the markets worry that Greece will eventually opt for a voluntary exit from the EMU causing Greek bond holders capital losses through currency devaluation. This also explains the post-November 2009 Greek "de-coupling" from Ireland, a country whose spread Greece was following closely up to that point. The difference between the two countries is that following the peak of the global credit crunch crisis in March 2009 Ireland announced bold, corrective measures convincing markets about its long-term commitment to the euro.

A new element: withdrawal of implicit fiscal guarantees

Finally, the third-generation crisis model, initially proposed by Krugman (1998) allows us to introduce a third decisive factor, default risk. The model's main assumptions are high international liquidity and government guarantees to the liabilities of insufficiently regulated financial intermediaries. In this model the currency crisis is just one aspect of a wider financial crisis caused by the distorting effects of guarantees on investment incentives. Under guarantees and lax supervision, intermediaries have both the incentive and ability to borrow short-term funds at low interest rates from international money markets. These are used to finance highly speculative domestic investment projects with thick right-hand side tails, i.e. projects of low expected return but involving a small probability of very large gains. These guarantees imply investors bear no downside risk, as they offer a "heads-you-win,

tails-you-do-not-lose" deal. Investors demand stakes in these projects in high quantities, driving up their prices and the value of the intermediaries that finance them. This increases confidence in the projects' success, leading to more short-term loans to intermediaries, further increases in demand for projects and further accelerating prices, significantly above fair value.

Then, returns on the projects are gradually revealed. Unavoidably, these will on average be lower than the best-case scenario investors had over-optimistically paid for. Less-than-maximum returns reduce assets prices and the market value of their managing intermediaries. Some over-leveraged intermediaries are refused finance to cover their liabilities and driven out of business. Investors receive the government bailout, but receding confidence in intermediaries, accompanied by more revelations of less than maximum returns reduces assets' prices further. The circular process described above now works in reverse, causing more bailouts. At some point, the cost of bailout reaches a critical level, prompting investors to realise that the government cannot afford them any further. This has a magnifying effect on capital losses, as assets prices adjust not only to the less-than-maximum current returns but also to the withdrawal of future guarantees. In one discrete drop, assets prices' shift from being the sum of current disappointing returns plus the discounted value of all future best possible outcomes, to the sum of the current disappointing returns plus all future expected outcomes. This causes extensive capital losses, resulting in more intermediaries' closures, capital flight, forced currency devaluation and a credit crunch spreading the crisis to the economy's real sector.

What is the relevance of this to the Greek debt crisis? Consider a scenario applying to the best part of the past decade with international investors having access to ample liquidity. Investors assess Greek bonds as a stake into a risky project, namely the restructuring of a relatively low-income, under-competitive and highly-indebted economy, with two possible

scenarios. *First*, an optimistic one, in which Greece would promote competitiveness-boosting reforms. In that case, starting from a low income base, it would become a fast-growing economy whose bonds prices will appreciate generating large gains for investors who took the bet. Second a pessimistic one, in which Greece would not promote reforms. In that case Greek bonds prices will depreciate and possibly involve losses for investors. In an undistorted environment, like the one prevailing before Greece's accession to the EMU, markets would price Greek bonds by assessing the probability of reform, i.e. future expected Greek fundamentals. In that case, Greek bonds would be priced at their fair value.

We now introduce Greece's 2001 EMU accession into the analysis and draw the analogy with Krugman's model. With Greece becoming a member of the single currency considerable European (mainly German) funds flow into the country. Markets perceived that the rest of the EMU countries had a vested interest in Greek reforms and Greece's continued participation in the EMU. This sentiment was further reinforced by Germany's long-term political commitment to the European integration project. Therefore, Greek accession was perceived to convey an implicit bail-out guarantee to holders of Greek bonds, with Germany in the role of the guarantor played by the government in Krugman's model. As a result, markets stopped pricing Greek bonds on the basis of expected fundamentals and started pricing them exclusively on the basis of the best-case scenario, i.e. achievement of full real convergence to German fundamentals. This is consistent with the downward structural break Arghyrou et al (2009) have found to occur in real Greek interest rates in 2000:Q3 not reversed in subsequent years.

Events then moved as follows: In the absence of an effective EU-sponsored mechanism of fiscal monitoring and imposed reform, Greek governments over 2001-2009 did not implement sound economic policies, thus allowing further deterioration of fundamentals. Therefore, the project of Greek restructuring did not achieve the best-case scenario of real

convergence envisaged by investors: Indeed, in previous research we have found that due to the lack of reforms, EMU accession caused net costs rather than net benefits in a number of areas (see Arghyrou 2006, 2009). As a result, starting in the summer of 2007, lower than anticipated returns on the Greek project gradually reduced the prices of Greek bonds, with losses accelerating significantly in the wake of the global credit crunch in 2009:Q1.

At that point, with the Greek bond market coming under intense pressure, investors in the Greek project looked to Greece's main guarantor, Germany, to back the Greek economy. Germany, however, refused to do so: it initially responded with a policy officially described as "constructive ambiguity" and then, to the markets' great surprise, in February/March 2010 made it clear that it was not prepared to help Greece unconditionally. The German stance was interpreted by markets as withdrawal of the fiscal guarantee for Greece. Therefore, the price of Greek bonds promptly plummeted, as the latter reverted to the value implied by the now significantly worse, compared to their 2001 level, Greek fundamentals. Without the fiscal guarantee, the EU/IMF rescue plan was judged as too small to cope with the ballooning Greek budget deficit and public debt. Overall, Germany's choice not to bail out Greece introduced a previously non-existent default risk, causing the decline in Greek bonds prices to accelerate in March-April 2010.

In all fairness, we have to note that successive German governments of all persuasions had been consistently stating over the years that if the circumstances ever arise, they will uphold the no-bail-out clause. Therefore, the policy of "constructive ambiguity" was justified on the grounds that a bailout would be seen as a shift in long-standing German policy, causing moral hazard discouraging Greece and other countries from pursuing reforms, thereby intensifying the present crisis and making future crises more likely. This was a fully plausible analysis which, however, now seems to have been wrong. It turns out that markets had never believed the no-bail-out clause and had been pricing, even well into the crisis,

Greek and other EMU bonds assuming a bailout. Hence, from the markets point of view, a bailout would not be news and thus would not destabilise the Eurozone further; instead the news was that there was to be no bail-out. All in all, the German-led policy of "constructive ambiguity" seems to have backfired: The withdrawal of the fiscal guarantee not only contributed to the collapse of the Greek bonds' market, thus escalating the crisis it was meant to contain, but may have also sown the seed of contagion to the markets for other EMU periphery bonds, also operating hitherto under the assumption of a German fiscal guarantee.

Are markets responsible in any way for the escalation of the Greek crisis? The answer is probably yes for misjudging the credibility of Germany's commitment to the no-bailout clause. Perhaps, they ought to know better. The closest available historical analogy is the ERM crisis of 1992-93. At the time Germany was called to make a choice between two conflicting objectives: On the one hand, maintaining internal price stability and economic restructuring following German re-unification. These goals called for higher German interest rates. On the other, maintaining momentum for European monetary integration by helping its ERM partners to cope with an economic recession. This called for lower German interest rates. Germany opted for the former, causing the ERM's demise and putting in jeopardy the whole EMU project just one year after the signing of the Maastricht Treaty. This event, combined with the consistent post-war nature of German economic policy confirmed that the latter's Holy Grail is low internal inflation and external currency stability. To this objective, everything else, including Germany's commitment to European monetary integration, comes second. With this experience available and with German policy announcements traditionally regarded among the most credible in the world, why markets chose to doubt Germany's commitment to the no-bailout clause is, to say the least, surprising.

Putting everything together: A summary of the Greek debt crisis

We now have a full set of ingredients offering a first analytically tractable explanation of the causes, mechanics, and timing of events of the Greek debt crisis. Our analysis suggest the crisis and its escalating nature are due to deteriorating fundamentals over the period 2001-2099 and a regime shift in market expectations, from a regime of credible EMU commitment under guaranteed fiscal liabilities, to one of non-credible commitment under no guarantees. This transformed a challenging crisis of fundamentals, first to a crisis of confidence in Greece's monetary regime, and then to a crisis of confidence both in the monetary regime and in Greece's ability to service its public debt.

These events can be explained within a framework extending the second-generation crisis model into one accounting for fiscal guarantees. We present a simple model that captures the main intuition. This involves three rather than two loss functions associated with continued EMU participation. The first applies to credible EMU commitment with fiscal guarantees. The second to non-credible EMU commitment under fiscal guarantees and the third applies to non-credible EMU commitment without fiscal guarantees. The model predicts that under the third scenario the cost of maintaining EMU participation rises to levels rendering continued participation almost impossible without non-market public debt financing.

4. A Model of EMU Exit under Shifting Membership Expectations and Withdrawal of Fiscal Guarantees

Assume a country joins the EMU at an exchange rate against the euro given (in logs) by $\bar{s}$. Every period following accession the government decides whether to stay in or exit. To do so the government balances the cost of exiting versus the cost of continued EMU participation. The former is assumed to be given by a fixed constant *C*. The latter is a positive quadratic function of the overvaluation of $\bar{s}$ relative to the country's equilibrium (PPP-consistent) exchange rate against the euro, denoted by *s**. Overvaluation of $\bar{s}$ relative to *s**

is costly as it reduces external competitiveness. This leads to negative economic outcomes, including lower output; increased unemployment; higher budget deficits implying higher borrowing requirements and a higher interest rate on government bonds; and higher current account deficit, increasing the stock of external debt and future interest payments to foreign creditors

The government's optimisation problem is solved conditional upon private sector expectations, which may fall in three regimes. In the first, markets perceive the country's future EMU participation as fully credible and outstanding government bonds to be fully guaranteed by the country's EMU partners. In that case, the loss of staying in the euro is given by L_1:

$$L_1 = [\gamma_1 (s^* - \bar{s})]^2 \qquad \gamma_1 > 0 \qquad (1)$$

The second possibility is that markets perceive future EMU participation as non-credible, in which case the interest rate of government bonds incorporates an exchange rate premium compensating for the risk of capital losses to follow reversion to the old national currency. Fiscal liabilities continue to be perceived as guaranteed by the country's EMU partners. For every level of overvaluation, the exchange rate risk premium increases the cost of staying into the EMU, giving rise to the loss function described by equation (2) below:

$$L_2 = [(\gamma_1 + \gamma_2) (s^* - \bar{s})]^2 \qquad \gamma_1, \gamma_2 > 0 \qquad (2)$$

Finally, in the third regime markets do not regard commitment to future participation to the EMU as credible and do not perceive repayments of government liabilities to be

guaranteed.[2] In that case, interest rates on government bonds not only include an exchange rate premium but also a default premium. For every level of overvaluation the cost of continued EMU participation increases further and is now given by:

$$L_3 = [(\gamma_1 + \gamma_2 + \gamma_3)(s^* - \bar{s})]^2 \qquad \gamma_1, \gamma_2, \gamma_3 > 0 \qquad (3)$$

Under all regimes the government will choose to stay in the EMU if the cost of continued EMU participation is lower than the cost of euro exit.

$$L_i < C \qquad i = 1,2,3 \qquad (4)$$

Normalising without loss of generality $\bar{s}$ equal to zero, the condition for staying in the euro have as follows:

Under credible EMU commitment and guaranteed fiscal liabilities:

$$s^* < \frac{\sqrt{C}}{\gamma_1} \qquad (5)$$

Under non-credible EMU commitment and guaranteed fiscal liabilities:

$$s^* < \frac{\sqrt{C}}{\gamma_1 + \gamma_2} \qquad (6)$$

[2] There is a fourth regime, in which the private sector views future EMU participation as credible without fiscal guarantees of government bonds from EMU partners. In this case however the country's commitment to EMU participation implies a strong incentive for sound fiscal finances. We therefore view this case as isomorphic to the first regime, namely credible EMU participation and guaranteed fiscal liabilities.

Under non-credible EMU and non-guaranteed fiscal liabilities:

$$s^* < \frac{\sqrt{C}}{\gamma_1 + \gamma_2 + \gamma_3} \tag{7}$$

Given $\gamma_2, \gamma_3 > 0$ we obtain:

$$\frac{\sqrt{C}}{\gamma_1 + \gamma_2 + \gamma_3} < \frac{\sqrt{C}}{\gamma_1 + \gamma_2} < \frac{\sqrt{C}}{\gamma_1} \tag{8}$$

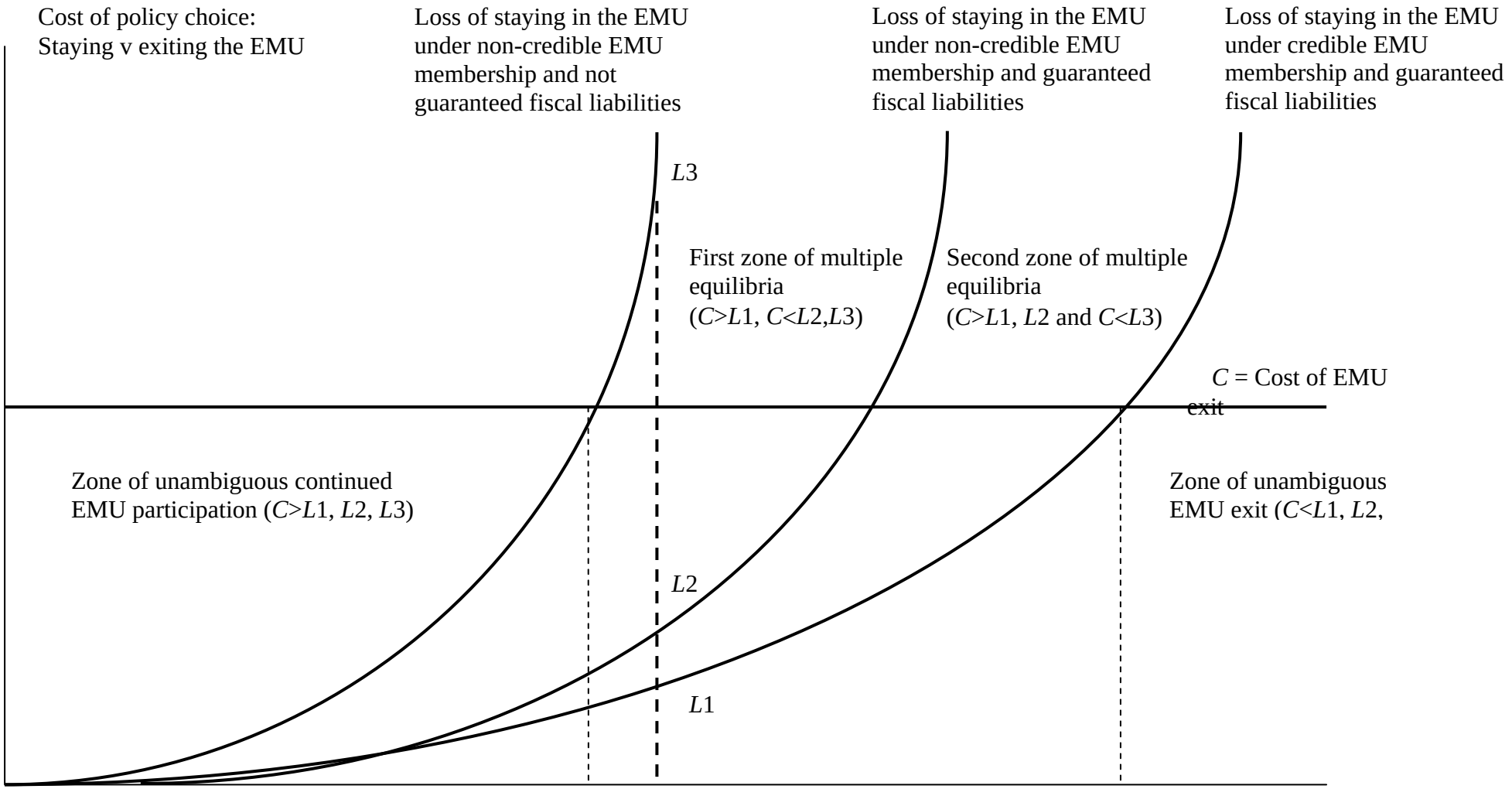
Conditions (5), (6) and (7) state that for every expectations' scenario there exist a critical threshold of overvaluation above which continued EMU membership is suboptimal. Condition (8) implies that this threshold reduces with negative shifts in expectations regarding the country's commitment to future EMU participation and the extent of fiscal guarantees. The model is presented diagrammatically in Figure 3. Compared to the second generation crisis model discussed in Figure 2, the model now allows for two rather than one zone of multiple equilibria: The possibility of withdrawing fiscal guarantees increases the cost of defending EMU participation under non-credible EMU commitment, thus restricting further the range of successful EMU participation defence.

Figure 3 can be used to explain the escalating nature of the Greek bonds crisis. The deterioration of Greek fundamentals occurring during 2001-2009 caused an overvaluation of the Greek exchange rate given by Q. This increased the cost of EMU participation by increasing interest rates on government bond yields, without however initially affecting market expectations. Interest rates on Greek government bonds subsequently increased along the predictions of loss function L_1. The unwillingness subsequently shown by Greek authorities to commit to the necessary reforms, as confirmed by the proposed 2010 budget

submitted to the European Commission in November 2010 put Greece's long-term commitment to the EMU into doubt. With expectations shifting from credible to non-credible commitment, interest rates on Greek government bonds increased to the level predicted by the loss function L_2, tilting the trade-off analysis against EMU participation. Finally, the revelation in February/March 2010 that the implicit fiscal guarantee perceived to have been given by the other EMU countries to Greece was not in place shifted Greece to loss function L_3 increasing the cost of servicing public debt to levels inconsistent with continued EMU participation. The realisation of this fact prompted Greece to look for non-market financing of its public debt, thereby asking for the activation of the EU/IMF rescue plan on 23 April 2010.

Before concluding this section, it is worth noting that further factors may be relevant. Their role, however, is unlikely to be decisive. For example, Greek spreads may involve an increasing liquidity premium. As, however, this is present in the market for the bonds of other periphery EMU countries, it's disproportionate increase in Greece is almost certainly due to the collapse of the Greek bonds caused by the factors explained above. In other words, any liquidity premium is most likely endogenous to the exchange rate and default premium. It is also possible that Greek spreads include overshooting effects caused either by real rigidities or by increasing market risk-aversion. However, as the length of the crisis has given markets enough time to correct any initial over-pessimistic assessments, it is unlikely that over-reaction is a major factor.

Figure 3: A model of EMU exit under shifting membership expectations and withdrawal of fiscal guarantees



5. Likely outcomes

Greece

Having analysed its likely causes, we now turn to likely outcomes. Assuming that the withdrawal of the EMU/German fiscal guarantee is permanent, for Greek spreads to fall it is vital that Greece return to a regime of credible EMU commitment. To achieve this, Greece must be seen to have the willingness and ability to implement the reforms necessary to improve its fundamentals. Given the loss of credibility Greece sustained after November 2009, the country would be highly unlikely to achieve a credible EMU commitment on its own. Therefore, activating the EU/IMF rescue mechanism was the only option available. By undertaking the unpopular decision of delegating its economic policy discretion to EU/IMF officials, Greece has sent the signal that it wants to maintain its EMU membership. This is an important step, but on its own, not enough. Greece must now convince markets not only that she wants to but can also implement required reforms. This creates a clear binary path for future events:

The first, optimistic scenario is that Greek authorities will show determination in implementing reforms and Greek citizens will accept them without major opposition causing social upheaval. In that case, as markets will be observing reforms' progress, confidence in the ability of Greece to implement them will gradually be built. With emergency EU/IMF funds offering a temporary fiscal guarantee, spreads will gradually subside, gaining momentum as Greek fundamentals are seen to be improving. In time, reforms will be seen to have progressed enough to establish full confidence in EMU participation, allowing withdrawal of the emergency EU/IMF fiscal guarantee and a gradual return to a regime of credible commitment and fiscal sustainability. Greece will have returned to a path of sustainable growth and its economy will emerge restructured and stronger. This will be a positive outcome, but there should be no illusions: Progress will only be gradual and not

easy: there will initially be significant short-run welfare losses through higher unemployment and reduced output. There are also external risks: the optimistic scenario assumes no further global economic shocks, no crisis' contagion to the bonds markets of other EMU countries and the availability of further EU/IMF funds if the necessity arises. Success through this path will certainly be difficult; but it is equally certainly possible; and even more certainly Greece's best, indeed only, hope to stay in the EMU.

The second, pessimistic scenario is that reforms will be strongly resisted and Greek authorities will shy away from pushing them through. In that case, markets will refuse to lend Greece funds and the EU/IMF rescue mechanism, which will involve conditionality clauses, will be discontinued. To stave-off an imminent social/economic breakdown Greece will then have no option other than to leave the EMU. This will eliminate the risk premium currently associated with the possible exit, but will almost certainly replace it by a premium associated with uncertainty surrounding the now independent Greek monetary policy. Furthermore, the devaluation of the new drachma against the euro will also devalue the assets of Greek banks, spreading the crisis into the real economy through liquidity shortages and high lending interest rates. Overall, an EMU-exit may provide some temporary breathing space, but even that is not guaranteed, and will not address the causes of deteriorating Greek fundamentals. Greece will still have to undertake the same painful reforms, this time however outside the EMU, and without any financial support its EMU partners may be willing to provide her economy.

Therefore, it all comes down to a straightforward question of public choice, ultimately to be decided by Greek citizens. Greek authorities must communicate the dilemma the country faces in clear, unambiguous terms, spelling out the full implications of both possible choices. They must also convince citizens it is in the country's best interest to implement the reforms necessary to remain in the Eurozone. Authorities should also convey to citizens the

message that the country needs to make a rapid decision: if markets do not observe substantial progress within the next few months, they will infer Greece has chosen not to stay in the euro and will force her out.

Other periphery EMU countries

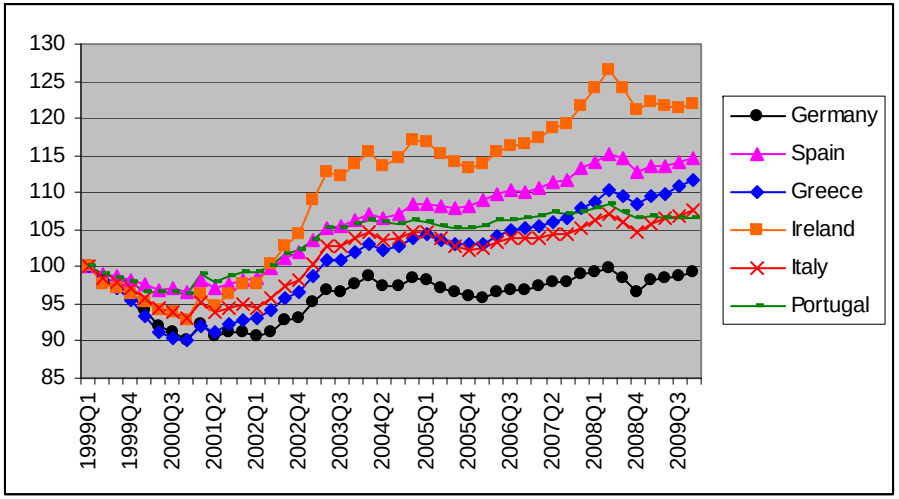
This brings us to the last, but by no means least, aspect of the Greek crisis, the possibility of contagion. Like Greece, since the euro's introduction in 1999 the remaining club-med countries (Italy, Spain and Portugal) and Ireland have all experienced significant deterioration in the value of fundamentals crucial for ensuring long-term EMU membership (see Figure 4). These include competitiveness losses leading to substantial current account deficits, particularly in Portugal and Spain (see also Arghyrou and Chortareas, 2009); and with the possible exception of Italy, a major fiscal deterioration in 2008-2009. However, despite its relative stability, the Italian public debt to GDP ratio in 2010 is projected to be above the 100 per cent threshold. At the same time, and compared to its 2007 value, public debt will have almost doubled in Spain and more than trebled in Ireland.

Based on the above, we conclude that although none of the other periphery EMU countries tick, as Greece does, all boxes in the explosive triplet of budget deficit, current account deficit and debt to GDP ratio, they are either close to doing so or they converge fast towards that point. The deterioration observed in the fundamentals of these countries may well have set them on a path where markets will soon question their commitment to future EMU participation, particularly in view of increasing unemployment rates. Furthermore, like Greece, all four countries now operate without the implicit EMU/German fiscal guarantee markets had perceived until very recently. As a result, any further increases in their public debt to GDP ratio may introduce a default premium into the interest rate of their government bonds.

Recent trends in the movements of spreads suggest that the country regarded by markets as most vulnerable is Portugal, followed by Spain. Despite the strong positive signals it has sent to markets in recent months, Ireland also remains vulnerable, as markets appear doubtful about their eventual success. Italy appears the most stable of all five periphery EMU countries. However, with a public debt to GDP ratio in excess of 100 per cent and structural weaknesses deeply entrenched, she can by no means take markets' confidence for granted. Albeit at different degrees, all four are vulnerable to the risk of contagion. To avoid this, it is essential for these countries to ensure they continue operating under a regime of credible EMU participation and perceived fiscal solvency. Therefore, they must also introduce, without delay, fiscal consolidation and extensive structural reforms addressing their competitiveness deficit. These will undoubtedly cause short-term welfare losses, raising the prospect of internal opposition. Therefore, the need to communicate clearly to their citizens the implications of hesitating to introduce reform is as important and urgent as in Greece.

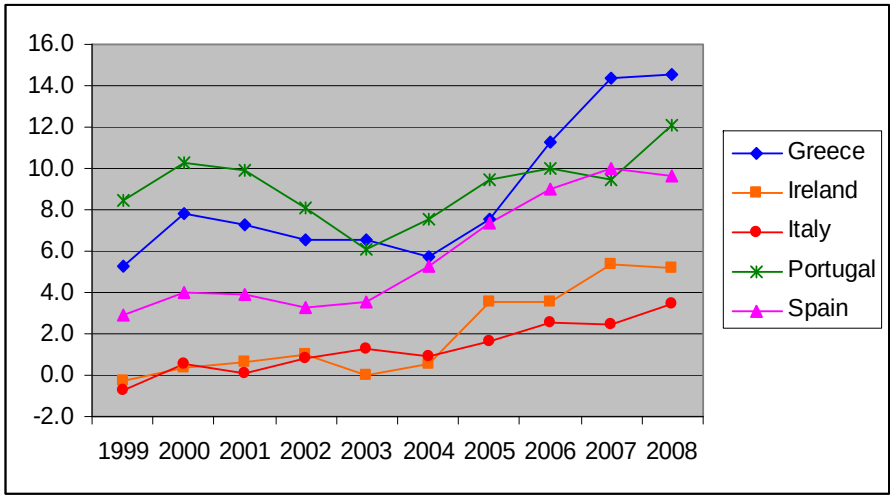
Figure 4: Macroeconomic developments in periphery EMU-countries

a) Real effective exchange rates, CPI-calculated



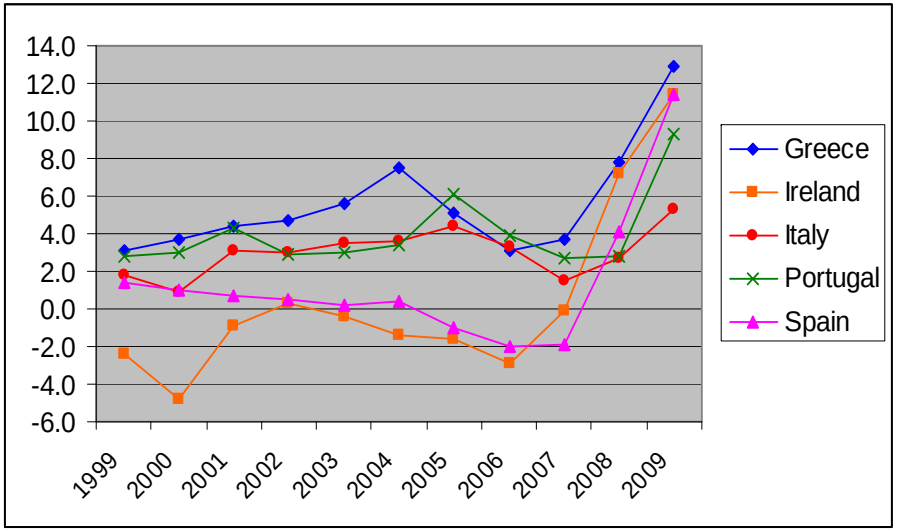
Source: Eurostat

b) Current account deficit (% in GDP, positive values denote surplus)



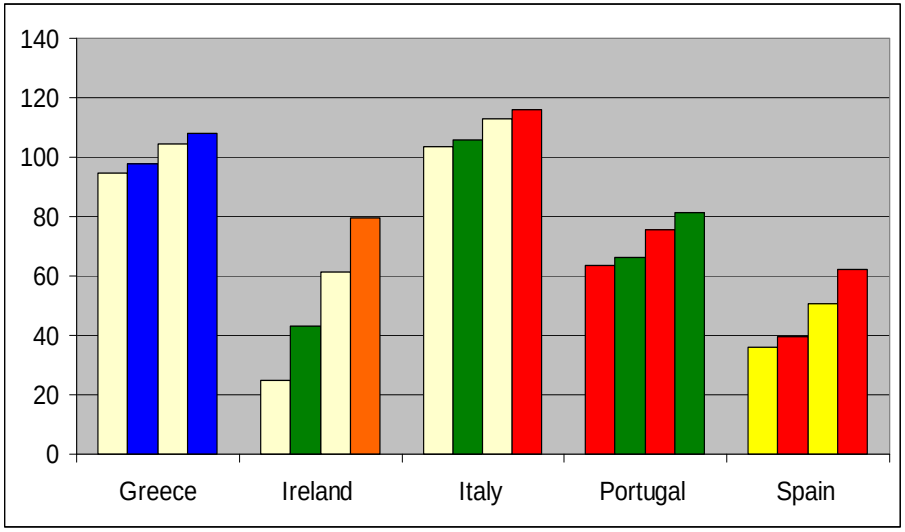
Source: OECD

c) General government deficit (% in GDP, positive values denote surplus)



Source: OECD

d) General government debt, 2007-2010 (% in GDP, projected values for 2010)



Source: Eurostat

6. Summary and concluding remarks

This paper has used insights from the literature on currency crises to offer an analytical treatment of the crisis unfolding in the market for Greek government bonds. We conclude that the crisis and its escalating nature are the result of (a) steadily deteriorating macroeconomic fundamentals over the period 2001-2009 to levels inconsistent with long-term EMU participation; and (b) a double shift in markets' expectations, from a regime of credible commitment to future EMU participation under an implicit EMU/German guarantee of Greek fiscal liabilities, to a regime of non-credible EMU commitment without fiscal guarantees, respectively taking place in November 2009 and February/March 2010. Following this shift, resorting to the EU/IMF mechanism of emergency financing on 23 April 2010 was the only option available for Greece to avert an imminent EMU-exit.

There is now a clear binary path regarding the outcome of the crisis. Either Greece will introduce the reforms necessary to address the initial source, i.e. deteriorating fundamentals, in which case and, assuming a favourable external environment, her economy will gradually regain the markets' confidence and the country will stay in the EMU; or Greece will not promote any reforms, in which case she will have no option than to leave the euro.

Regarding the possibility of contagion, all other periphery EMU countries, Ireland, Italy, Portugal and Spain, appear (at varying degrees) vulnerable, as since their euro-accession in 1999 they have also experienced significant deterioration in key fundamentals. Furthermore, the withdrawal of the implicit EMU/German fiscal guarantee applies to these countries too. To avoid the adverse shift in markets' expectations Greece has experienced, these countries must also pursue, without delay, fiscal consolidation and extensive structural reforms.

What are the institutional lessons drawn from the Greek crisis so far? To minimise the risk of contagion of the present crisis and to avert future ones, it is important for the EMU to undertake institutional reforms in two directions. First, to prevent future crises, improve the effectiveness of fiscal supervision applied to individual EMU-member states. Second, for handling this crisis and future ones, minimise the risk of default risk. To achieve this, the EMU must develop a mechanism of emergency financing, with clear and transparent rules reassuring markets that no money will be lost on investments involving EMU government bonds. The EU/IMF mechanism put in place for Greece is helpful but unlikely to avert crises in other countries, as it is an ad-hoc arrangement involving an external institution, the IMF, to EMU affairs. This is a disadvantage, for the following reason. The prospect of IMF involvement into handling future EMU crises may fail to reduce market uncertainty, as no effective ex-ante guarantee can be given for the possibility of co-ordination failure between the EMU and the IMF. Therefore, without an exclusively EMU-run mechanism of crisis management, the EMU may find it difficult to stabilise market expectations at the crucial initial stages of a crisis. Defining the rules of a European Monetary Fund will be a challenging task, as these should be able to reassure investors without causing moral hazard leading to excessive deficits and lack of reform. This is a topic calling for significant attention from academics and policy-makers alike.

But when all is said and done, ending the current EMU crisis and averting future ones ultimately depends on one single factor: the willingness of societies in the EMU periphery to take the significant short-run welfare cost that will accompany reforms. It is therefore vital for governments, to communicate clearly to their citizens what the stakes are in not promoting reforms now; and convince them that since the

latter will have to take place anyway, it will be preferable for their own long-run welfare to undertake them within the euro rather than outside it.

There is one final risk: over the past decade EMU periphery economies have diverged so much from those of core EMU countries that either they cannot sustain, or markets regard them as not being able to sustain, the cost of reforms necessary to stay in the Eurozone. At this stage it is impossible to know whether this is true; but if it is, it will be extremely challenging for European governments to sustain the euro. We believe that European governments must have a plan to face such as scenario. Allowing individual economies to exit the euro on a unilateral basis is an easy, yet inappropriate response, as one country's exit will very likely cause a domino effect, with markets eventually forcing all struggling economies out. From an EMU perspective such a development will obviously be catastrophic, but is there any alternative?

We believe there is: In a recent paper (Arghyrou and Tsoukalas, 2010), we have spelled out a plan of last resort to resolve the present crisis, to be used only if everything else fails. The key ingredients involve a temporary split of the euro into two currencies both run by the ECB. The hard euro will be maintained by the core-EMU members whereas the periphery EMU countries will adopt for a suitable period of time the weak euro. All existing debts will continue to be denominated in strong euro terms. The plan involves a one-off devaluation of the weak euro versus the strong one simultaneously with the introduction of far reaching reforms and rapid fiscal consolidation in the periphery EMU countries. We argue that due to enhanced market credibility the plan will have a realistic chance of success, maintaining the project of European monetary integration and leaving the door open to the periphery countries for a return to the strong euro.

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